

concrete construction

FEBRUARY 1958

VOL. 3, NO. 2

EDITED FOR

All who are concerned with quality, JOB PLACED CONCRETE (including prestress, tilt-up, lift slab, and thin-shell)—its production, handling, forming, reinforcing, placing, finishing, and curing: CONCRETE CONTRACTORS; GENERAL CONTRACTORS; INDUSTRIAL CONSTRUCTION AND MAINTENANCE MEN; ENGINEERS; ARCHITECTS; STATE HIGHWAY ENGINEERS; READY-MIXED CONCRETE PRODUCERS.

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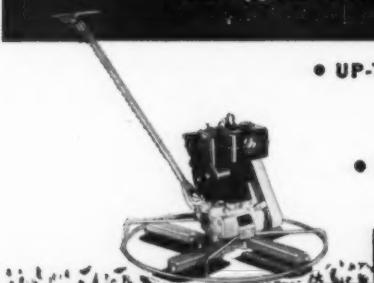
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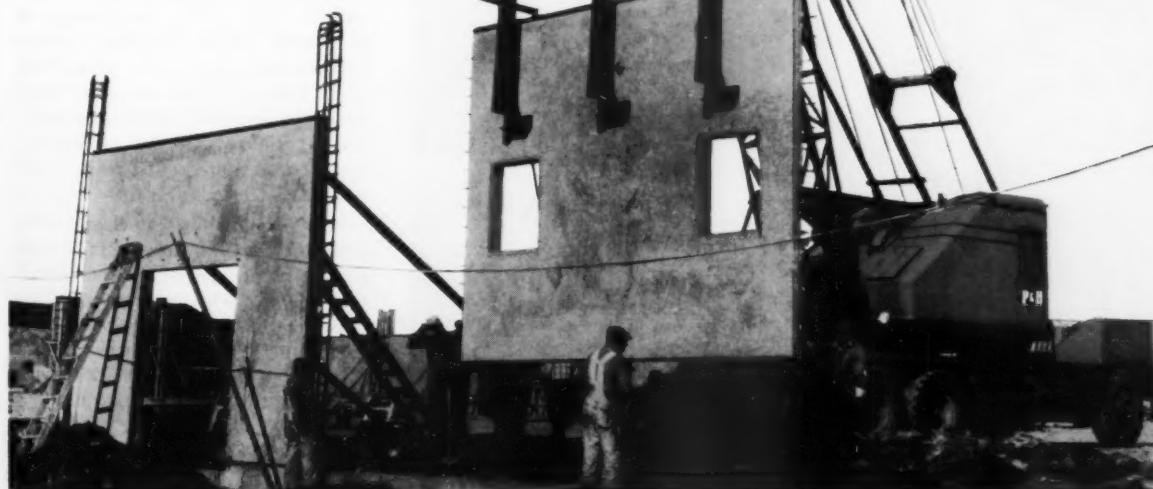
35-ton P&H 555 A-TC truck crane placing 28-ton concrete wall panels in construction of \$2½ million tannery plant.

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New Developments in the Design and Construction of Concrete Pavements*

The dramatic growth in the use of concrete for pavement work is shown in this display first exhibited at the 1957 Road Show. The prototype section of concrete consists of a 10-inch thick reinforced slab of air-entrained concrete, with a sawed joint and skid-resistant surface, placed on a 4-inch thick non-pumping granular subbase.

By Gordon K. Ray

Highways & Municipal Bureau
Portland Cement Association

THE LARGE VOLUME of airfield pavement construction in the past 6 or 7 years has led to a number of important changes in construction equipment and techniques—some of which, at least, are already finding their way into general pavement practice.

High take-off and landing speeds, for example, have required a severe tightening of specification surface tolerances and grade control in order to provide the plane surface necessary for safe operation. The resulting new grade control requirements (.04 feet from grade at all points) have demanded more accurate form setting and a closer straightedge testing of forms and surface. This rolling straightedge, or hi-lo tester as it is called, can accurately detect deviations of as little as $\frac{1}{8}$ inch in 12 feet on either forms or finished concrete. This is the maximum permitted in the longitudinal direction on runways and taxiways for the Air Force today.

New finishing equipment is being built to assist contractors to meet these stricter surface tolerances and also to combine the work of the transverse finishing machine and longitudinal float to permit the elimination of one piece of equipment from the paving train. An early experimental machine

*Based on a paper presented before an engineering seminar at the U. S. Naval Construction Battalion Center, Davisville, Rhode Island.



employs a 30-foot wheel base, 2 transverse screeds and one float. It was used on 2 large projects in California and Arizona. A somewhat similar machine has been used on a number of 24-foot wide highway projects throughout the midwest during the past two seasons.

The stricter surface tolerances have required more careful use of scraping straightedges. These 12-foot long tools must be used transversely, longitudinally and even diagonally if the smoothness requirements are going to be met in both directions.

If the final straightedge testing of the finished surface reveals any high spots which exceed the specification tolerances, these must be ground down or the slab removed. One new machine for cutting off high spots has a 16½-inch wide head consisting of a series of diamond saw blades. The head can be set on the 12-foot wheel base machine so that it cuts all high spots to meet specifications.

Jet blast and high tire pressures encountered on modern airport pavements have led to better joint construction to eliminate spalls and ravelling which sometimes occurred on hand formed dummy grooves and buried premolded bituminous strips. Sawed joints* were perhaps one of the most important recent developments in concrete paving technology. When such joints are sawed in the hardened concrete at the proper time, cracking is controlled and a durable, smooth riding, attractive joint results.

The saws for cutting such joints have progressed rapidly in the last 6 years to recent self-propelled 36-horsepower machines capable of cutting joints up to 5 or 6 inches deep in the hardest coarse aggregates. Sawblades have also gone through a rapid series of improvements, both the steel diamond-tipped blades which are used in the harder coarse aggregates and the abrasive blades made of silicon carbide and reinforced with metal or fiber glass-nylon mesh. Both types of blades are available in a variety of diameters and widths, but the abrasive blade is much cheaper and has the further advantage that it can be used dry while the diamond blade must be provided with a pressure spray of cooling water. Dry sawing permits earlier sawing without ravelling or erosion in the joint, but unfortunately abrasive blades are only suitable in concrete made with the softer coarse aggregates, such



Photo courtesy Concut Sales, Inc.

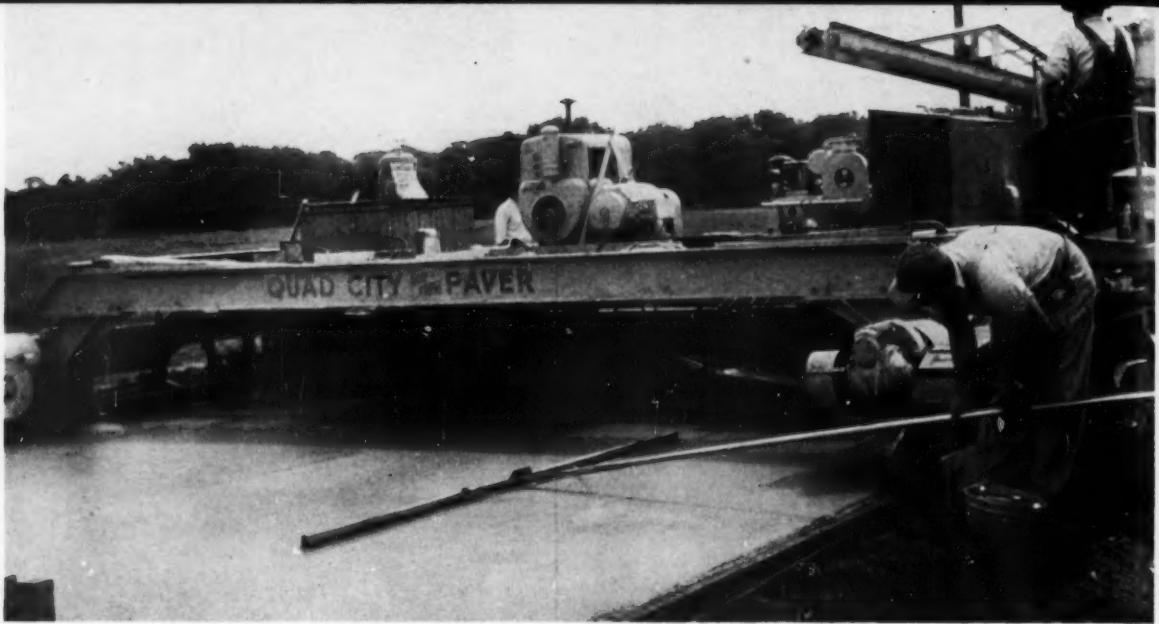
High spots on finished pavements can be ground off with special bump cutters of the type shown here. The cutting head on this machine consists of a series of diamond saw blades. Two or three passes are generally necessary to plane most surfaces.

Tighter specifications on surface tolerance and grade control have led to the development of machines like this rolling straightedge which can detect deviations of as little as $\frac{1}{8}$ inch in 12 feet on finished concrete. The machine automatically dye marks slab areas which are not within specification limits.

Photo courtesy Viking Manufacturing Company



*See "Sawed Joints," *Concrete Construction*, January 1958, page 3.



View of a modern slip-form paving machine at work on a highway project in Iowa. Finishers with straightedges and floats do final surface finishing behind paver, but inside traveling forms.

as limestone, slag and coral.

Two new modifications of sawed joints have been developed in an effort to reduce the cost of sawing in hard aggregates and permit earlier sawing to insure positive crack control. One requires using a special machine which vibrates a transverse bar made of perforated metal into the concrete surface at the exact joint location to displace the coarse aggregate. As the still vibrating bar is removed from the concrete, mortar only flows back into the groove created. The surface is then straightedged, and at the proper time, a joint is sawed at the same location. The displacement of the hard coarse aggregate permits the use of an abrasive blade and results

in tremendous sawing economy.

The second modification involves the insertion of an asphalt-impregnated felt board of the proper dimensions at the joint location. The surface over the strip is then straightedged and finished in the conventional manner. This strip, which creates a weakened plane and acts as a dummy groove joint, can remain in place until the contractor is ready to seal the joint. Then it is removed with an abrasive blade slightly wider than the strip. Usually specifications require the removal of only the top 1 to 1½ inches of material.

One new development in equipment which is applicable only to highways is the traveling form paver. This machine operating on crawler tracks can

place a 24-foot wide slab up to 10 inches thick. Used to date on highway projects in several midwestern states, it permits rapid construction with a small paving crew to fairly accurate surface tolerances.

Another new pavement development of primary interest to maintenance engineers of highways and airports has been thin bonded concrete resurfacing. Using construction methods developed in the Portland Cement Association's laboratory and field tested on a number of jobs under severe conditions of exposure to weather and traffic, resurfacings of 1 inch or more can now be placed on old slabs suffering from scaling, popouts or other surface deterioration.

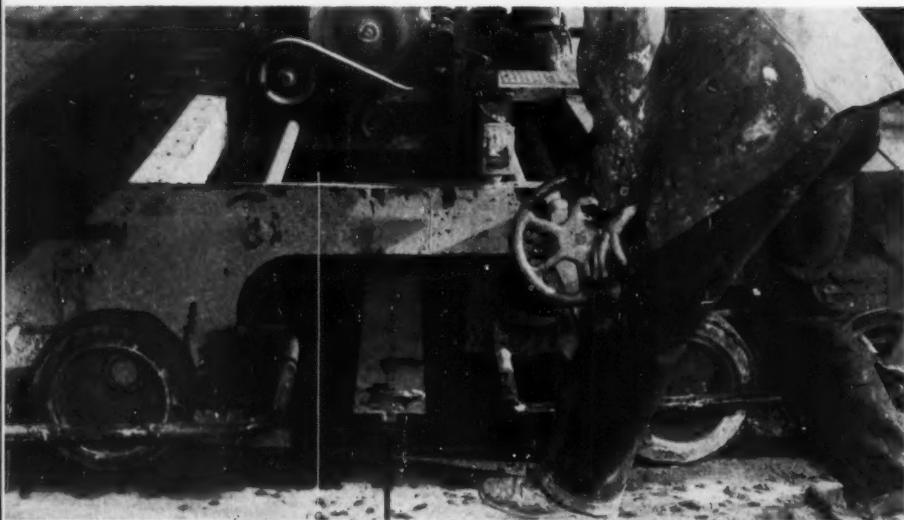


Photo courtesy Seaman-Andwall Corporation

A new development in connection with sawed joints is this special machine which vibrates a transverse metal bar into the concrete surface at the exact line of a proposed joint to displace the coarse aggregate. When the still-vibrating bar is removed, only mortar flows back into the groove. Use of this machine is said to result in important savings, since the joint can later be sawed with an ordinary abrasive blade in less time and at far less cost because the hard coarse aggregate has been displaced.

This method has been successfully used on the Pennsylvania Turnpike, two Air Force Bases and several bridges. It consists of removing all loose, unsound concrete from the surface with some type of cutting or chipping machine, removing oil and grease drippings with a detergent, etching the surface with muriatic acid, brushing into the surface a bonding coat of grout made up of a 1-1 sand-cement mix and finally placing the resurfacing concrete of the desired thickness using a mix of air-entrained concrete having about the same strength as the base slab, and coarse aggregate with a maximum size not over one-half the resurfacing thickness.

The large volume of stiff, low-slump concrete demanded by modern pavements brought about the use of internal vibration in slabs about 12 inches thick to insure proper consolidation.

Probably one of the more significant changes has been the increase in pavement thicknesses. Slabs of 19, 21 and even 24 inches are not uncommon at the heavy bomber bases being built today. This alone has tested the ingenuity of contractors and equipment manufacturers. Higher forms, heavier equipment and more mechanization are just a few of the apparent changes.

Higher forms and heavier equipment mean sturdier forms and more and longer form pins to hold them securely in place. Longer pins mean pneumatic tools for driving them and removing them. Hand tools are no longer adequate.

Thicker slabs mean larger volumes of concrete and more mixers or pavers

to make fast enough forward progress to permit proper timing of finishing and curing. More pavers in turn require larger batch plants capable of accurately proportioning and recording tremendous volumes of material. In a 10-hour construction day a typical batching plant may handle over 5 million, 800 thousand pounds of cement and aggregate to keep up with a paving crew using only two 34-E pavers, and many contractors will use more than this. Today's specifications call for each of the 1,110 batches in such a day to be automatically weighed and dumped and the precise weight of each ingredient in each batch electronically recorded on a continuous record.

Other fairly recent developments include polyethylene curing sheets¹, Styrofoam joints², the Chace pocket air indicator for measuring the air content of fresh concrete, the Willis-Hime test³ for measuring the cement content of plastic concrete, and soil-cement and cement treated base as subbases under concrete and bituminous surfaces. Probably the latest idea, still in the early experimental stages, is prestressed concrete pavements.⁴ All these developments bear out the observation that the whole field of concrete pavement construction is moving rapidly. END

¹See "Polyethylene Film," *Concrete Construction*, January 1957, page 2.

²See "Rigid Plastic Foam," *Concrete Construction*, May 1957, page 8.

³See "A Quick Method for Determining Cement Content of Fresh Concrete," *Concrete Construction*, October 1957, page 8.

⁴See "Experimental Highway of Prestressed Concrete," *Concrete Construction*, July 1957, page 3.

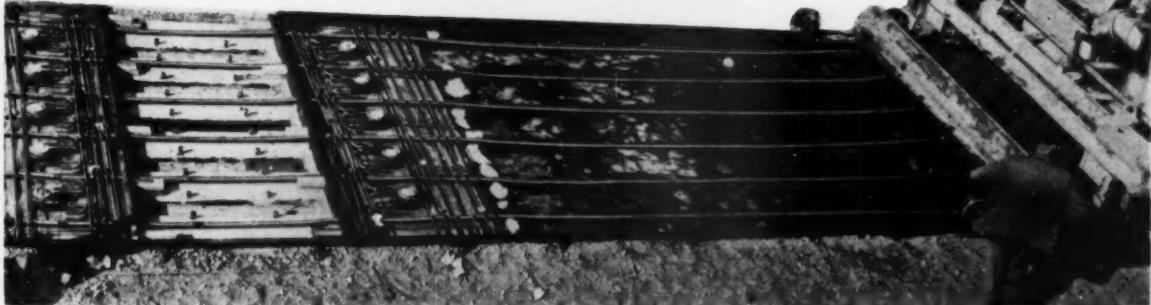


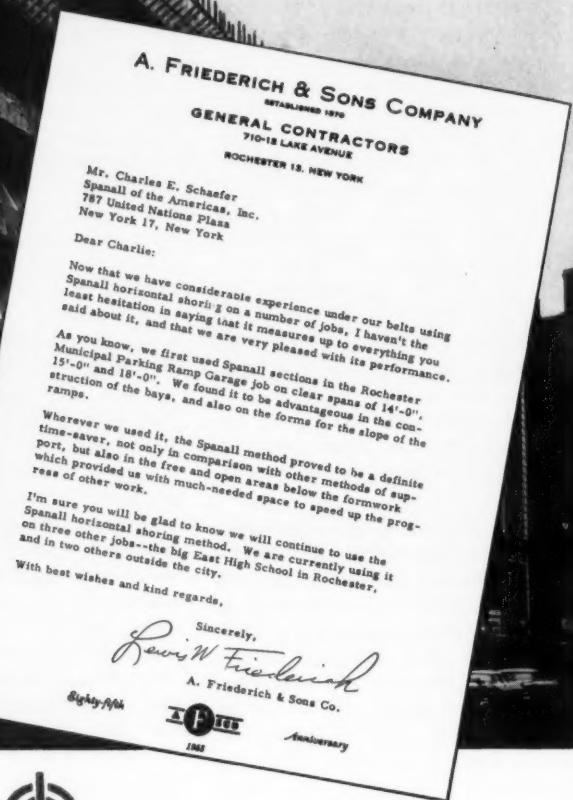
Photo courtesy Dow Chemical Company

This picture shows rigid plastic foam being used to form transverse contraction joints. The joint groove is formed with a T-shaped metal bar immediately following the longitudinal float. When the metal bar is removed, the strip of plastic is inserted and the joint area is then finished by hand. This technique keeps the joint free of debris until the contractor gets around to installing a permanent joint sealer.

One of the most recent developments in the field of concrete paving is an experimental prestressed concrete pavement. Here a paving machine at the right is placing concrete over the flexible conduits which contain the wire strands which were later post tensioned. The prestressing was done by leaving a 6-foot gap in the center of the strip and jacking the sections apart after the concrete had set. Advantages hoped for are the elimination of many transverse joints and the ability to provide for modern loads with thinner slabs.

Photo courtesy Jones & Laughlin Steel Corporation





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Bids Should be Based on Knowledge

HARD, SHARP COMPETITION, such as characterizes the American business scene today, makes heavy demands on those who would play a vital role in this vast scheme of things. For those who are determined to survive beyond the short term, it places burdens that can be borne only by men who have mastered all of the factors involved in their particular field. For the man who wrests his living from the construction industry by competitive bidding, it is of vital importance to have a most complete and detailed knowledge of all costs that are involved in doing any one particular job. Yet the average small contractor has no time to make a detailed analysis of job costs, nor does he usually have the means to employ those who are competent to evaluate cost material and present it to

him in a usable form.

There is a way, however, to get on top of the cost study problem that is not financially burdensome, nor does it require neglecting other duties to spend time on the collection of cost data. Summer is the busy time and that is when a variety of jobs are available for study. It is also the time of year that many engineering students are available for summer jobs, and an engineering student that has finished this third year should be able to collect and evaluate detailed cost data on a number of jobs.

Some of this data can be collected from jobs being done by others. These cost items that are studied and recorded should include every detail of the work, in so far as is possible. It is of little value to sum up the cost of a

job, then bring the final result down to the average cost per cubic yard, and say that is what it costs to do work. Rather, set up in outline form each operation involved in setting forms, including transportation, storing, moving, erecting, oiling, maintenance, depreciation and similar items.

The list of items to be studied should be fully prepared before the study starts; winter is a good time to work up the outline to be followed. Then set your man to keep a close accounting of all the costs involved, including those that you may have omitted, in each of these operations. Do the same with placing, curing, patching and every other phase of your operations. When the work is finished the record should show in detail just where every nickel went. (MORE)

FORM A

Job _____

Date _____ By _____

At _____ Sheet _____ Of _____

Men On Job & Classification

- 1 Superintendent
- 1 Foreman (labor)
- 1 Timekeeper
- 1 Oper. Engr. (crane)
- 3 Oper. Engr. (rigs)
- 1 Oper. Engr. (F.E.L.)
- 1 Oiler
- 1 Master Mechanic
- 2 Chauffeur
- 12 Laborers

Equipment

- 1 Crane (38 B)
- 1 Front End Loader (1 yard)
- 3 Drill Rigs
- 2 Trucks (1 Repair Pickup,
1 Flat Bed)
- 1 Compressor (60 cu. ft., 1
Jackhammer)
- x Pumps

Description of Job Conditions

- General description as to location, working room, accessibility, etc.
- Soil condition as effecting digging, bottom and side condition, drainage, etc.
- Disposal of excavated material
- Accessibility to point of deposit for ready-mix concrete trucks
- General description of operation

FORM B

Job Memorial Hospital **Location** 1000 B Street, City
Architect Black, White, & Associates **Made by** JAW **Date** 12/15/56 **Sheet** 1 **of** 1
For General Contractors (6 requests)
Owner takes bids at 150 E. State St., City **Jan.** 17 57 **2:00 PM CST**
No. of Caissons 132 **Base Length** 65 ft. **Bells:** with 120 without 12
Diameters 2 ft. 6 in.; 3 ft. 6 in.; 4 ft. 0 in. **Base Volume** 61,472 cubic feet

A. Drilling Crew/Day

1 Superintendent.....	\$45.00
1 Foreman.....	28.27
1 Timekeeper.....	20.00
1 Master Mechanic.....	44.00*
1 Oper. Engr. (crane).....	42.30*
1 Oper. Engr. (F.E.L.).....	39.00*
5 Oper. Engr. (Rigs).....	190.20*
1 Oiler.....	26.50*
2 Chauffeur.....	58.20*
16 Laborers.....	440.00*
1 Iron Worker.....	42.60*
	<hr/>
	\$ 976.07
Payroll Expense @ 14%.....	138.05
	<hr/>
Total Labor Cost/Day	1,114.12

B. Plant/Day

1 Crane.....	150.00
1 Front End Loader.....	50.00
5 Drill Rigs.....	300.00
1 Repair Truck.....	30.00
1 Flat Bed Truck.....	20.00
1 Pump - 2 inch.....	5.00
L.S. Small Tools & Supplies....	20.00
	<hr/>
Total Plant/Day	575.00

Schedule

Use 5 Rigs
 Progress: 2 holes/shift/rig
 Shafts/shift 10
 Cubic feet/shift 4,660
 Cost/cubic foot 0.3625

C. Material

Concrete, including waste	41,760.00
Casing.....	5,000.00
Disposal**.....	5,074.00
Fuel.....	1,166.00
Reinforcing.....	1,198.00
	<hr/>
Total Material Cost	54,198.00

D. Indirect Cost

On	
On & Off.....	1,100.00
Travel & Expense.....	200.00
Field Office.....	500.00
Utilities.....	750.00
Freight.....	1,500.00
	<hr/>
Total Indirect Cost	4,050.00

Labor-Plant Cost/Day Combined

Labor (item A).....	1,114.12
Plant (item B).....	575.00
	<hr/>
Total Labor & Plant Cost/Day ..	1,689.12

Summary

Labor & Plant/cubic foot.....	0.37
Material/cubic foot.....	0.88
Indirect/cubic foot.....	0.07
Total Cost/cubic foot.....	1.32
Mark up.....	0.58
Bid/cubic foot.....	1.90

Lump Sum Bid 61,472 cubic feet @ \$1.90
 per cubic foot

Total \$116,786.80

Extra for increased footage \$1.83/
 cubic foot

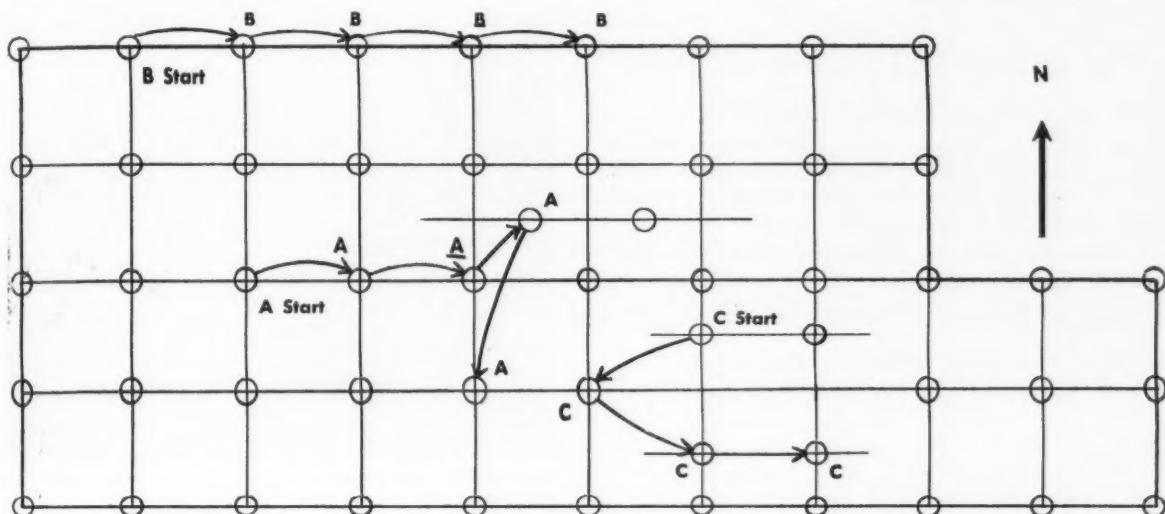
Credit for decreased footage \$1.25/
 cubic foot

*10 hour day
 **Sub-contract

FORM C

Date _____ By _____

Job _____ At _____ Sheet _____ Of _____



Layout of Job and Movement of Rigs During Day

RIG

A	Started 7:00; Belling 9:05; Finished 9:20. Moved by crane.
B	Started 7:00; Belling 9:30; Finished 9:45. Moved by own power.
C	Started 7:00; Finished 10:15. Moved by crane.
A	Started 9:29; Finished 1:20; Moved by crane.
B	Started 10:20; Belling 1:33; Finished 1:48. Moved by own power.
C	Started 10:34; Finished 3:50. Lost 2 hours, 20 minutes for repairs.

The two forms on these pages and the one on page 9 are designed to provide an orderly means of accumulating basic cost and operating information applicable to concrete construction work.

Why go to the trouble and expense of making such studies when you are now getting plenty of work and showing a profit? Besides, you say, you have been in the business for years and if there is one thing you know about the work it is what it costs. Here are a few suggested advantages that can accrue to you from such a cost study. The first advantage, and the one that is probably of greatest value, is the ability to take the results of the study, assemble them in whatever way is most convenient, and from them work up a cost estimating form that will include all of the costs that have been run down and evaluated. This form can be made to fit each individual organization's specific needs, and it can be

made to call attention to all of the costs normally involved. An open space is also recommended that will direct attention to the task of looking for extra or unusual costs.

The form should be so designed that it must be completely filled out before a cost figure can be determined. The use of this technique can ease and speed the work of estimating. A second advantage is elimination of unnecessary costs. You may find that you are doing work that could better be eliminated, or you may find that by changing a method you can make an overall saving. Third, you will have detailed, intimate, and up-to-date knowledge of the cost structure in your particular industry. And last, the student that you hired for the summer

may come back after graduation and develop into a very valuable employee. The construction industry can use more industry-trained engineers at all levels.

The suggested cost study will be both simplified and expedited by the adoption of simple forms for the systematic collection of the desired information. Of the forms accompanying this discussion, A and C provide for the accumulation of basic cost and operating information for the job-cost study to be made, while Form B is simply an estimating sheet specifically adapted to concrete construction work. A good take-off man working with forms of this type can save a busy contractor a lot of time, money and aspirin.

END

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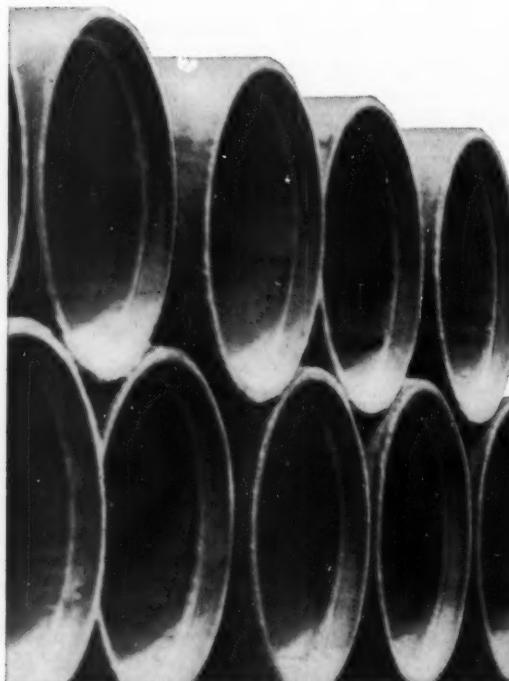
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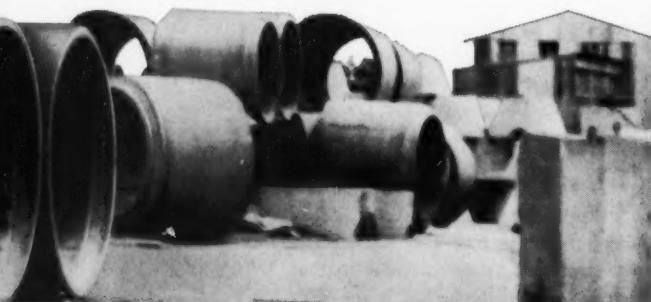
Faster early strength (50% greater at 72 hours) lets most skilled trades get to work without delay and resulting overtime.

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Units move faster and store better when Columbia Calcium Chloride is part of the mix. Pre-cast block, panel, or pipe products cure days faster with substantially reduced breakage and chipping. Columbia Calcium Chloride has the unique property of working hardest when the temperature drops to 50° or below. You can safely cut pre-steam holding time, steaming and soaking periods. You'll experience far less cracking during early handling, too. With faster production, you save on inventory, as well. Customers get better concrete products, with deliveries dovetailed more dependably to their construction timetables. It's a great way to build business.

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A close-up view of the dimpled concrete. While the plastic film gives the concrete a glossy surface, shadows and highlights are provided by the dimples which are formed by the underlying layer of crushed rock.

Another article in our series on special finishes for concrete. Although the technique described may seem highly specialized, it has interesting possibilities.

Dimpled Concrete

By E. L. Howard and Don McDonald

*Pacific Cement & Aggregates, Inc.
San Francisco, California*

YOU GET ACCUSTOMED to some unusual specifications in the concrete game, but we were admittedly stumped for a while when one of the requirements of a recent job was that the concrete surface be rough enough so that youngsters would be unable to write on it. This strange requirement turned up in connection with a tilt-up wall project, in which great stress was also laid on the need that the wall be attractive, inexpensive and easy to apply.

Our first attempt was to pour concrete on a rubber mat having waffle-like indentations. Developed in Great Britain, this process was first described in the September 1956 issue of *CONCRETE CONSTRUCTION*, page 10, and a follow-up article also appeared on page 13 of the July 1957 issue. The process consists of lining formwork with rubber sheeting of any desired pattern and texture, placing and vibrating the concrete against the sheeting to cast its pattern into the surface of the structure, and finally stripping

the rubber sheeting away from the concrete surface. Normally the sheeting is either glued to the forms or fastened by means of clips, but in the experimental work we conducted for tilt-up wall construction the sheeting was simply laid on the casting surface. We found that suitable rubber matting could be obtained in many patterns, and laid in strips or squares to achieve any effect the designer might wish. Unfortunately the cost proved to be prohibitive on our particular project, and we were compelled to look elsewhere for a solution.

We therefore conducted experiments in our laboratory with a view to developing some technique which would result in a very rough concrete surface at low cost. Small casting panels were built and filled with several sizes of gravel and crushed rock, and then covered with plastic membrane to form the base material for casting concrete. Under laboratory conditions it was found that the underside of the slab

could be roughened in this fashion in many attractive patterns by simply varying the base material.

When a satisfactory amount of experience had been gained in the laboratory, the technique was then tested under actual job conditions. It was found that standard procedures used in tilt-up construction could be adhered to with entirely satisfactory results. Although it was found that particular care should be used in spreading the base rock and overlaying it with the plastic sheet, there was nothing about this work that could not be performed by the ordinary contractor's crew. It developed that the plastic material formed dimples more readily on warm, sunny days, but it proved to be a simple matter on cold days to warm the sheets before applying them.

It is our belief that the dimpled surfaces produced by the use of a base rock course and plastic sheeting have a place in home and industrial concrete as well as in schools. We know of at least one contractor who plans to precast sidewalk and patio sections by this method. The limited work we have done indicates that the use of several sizes of base rock would provide a ready means of varying the dimple pattern. By this means, and with a very little practice, it seems certain that many attractive surfaces could be produced.

The process can also be varied to produce an attractive exposed aggregate surface. In place of the plastic sheets, this would involve using a colored stone base material covered with mortar worked well into the voids. The mortar should be fresh when the concrete is poured and deep enough to allow bonding with the poured concrete. The colors of the exposed rock can be highlighted by using a white cement-sand mortar, and some designs may include the use of redwood strips and other such devices to achieve special effects.

Actually, the only real limitation on the possible decorative patterns which may be achieved in this fashion is the limitation on the imagination itself. With more and more emphasis being laid these days on the elimination of special finishing operations after concrete has been placed, it is our belief that designers and field men will eagerly explore the possibilities of a technique that so readily and cheaply makes it possible to cast attractive surfaces right into the concrete. END

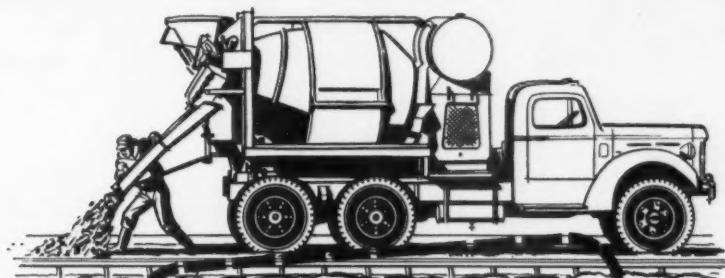


One of the dimpled concrete wall panels after it had been stripped from the form and tilted into place. Conventional tilt-up procedures were used throughout the casting of these panels, with the exception of the use of a crushed rock base course and plastic film producing the dimpled surface.

Here workmen are carefully anchoring the plastic film material to the side forms. Note that the crushed aggregate base material is already in place inside the form.



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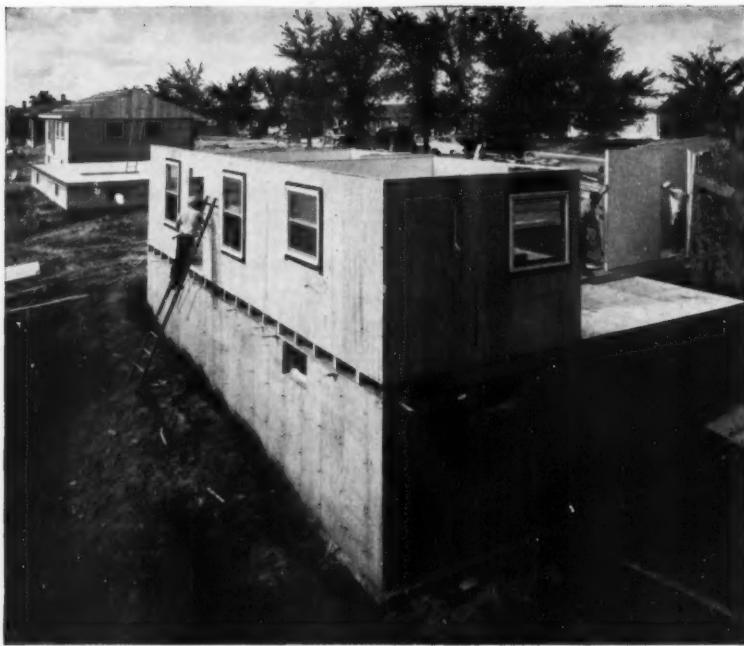
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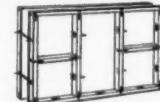
Many contractors prefer large panels for concrete forming

Symons develops long life, labor saving Wide Panel Forms

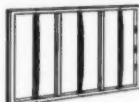
Many concrete contractors that have been in the business for years prefer the large 4' x 6' and 4' x 8' panels. They believe these panels are the cheapest and the best for house foundations. The wide panels can be used horizontally for crawl space foundations or vertically for basements.

Large panels often weigh at least 100 lbs. when dry and far more when wet. It is not always easy to find men willing to carry these wide panels single-handed. There are, however, crews that will and the men take much pride in being able to carry the heavy weight panels.

Three Types of Large Panels



For contractors that prefer wide panel forms, Symons Clamp & Mfg. Co. has developed



Wide Panel with Steel Struts

oped three types of large panels. Two of these have wood frames reinforced

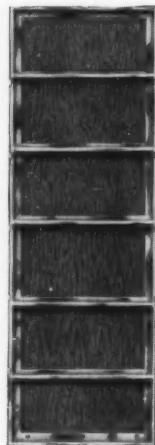


Wide Mag-Ply

with steel. The advantage of the wood rimmed forms is their low first cost and their adaptability for all kinds of jobs. The third type has a magnesium frame that protects the plywood edges and provides ample strength with light weight. Magnesium Forms are expensive, but will give a very low cost per use to the contractor who can use them fifty or more times per year.

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Symons forming system includes just 3 pieces . . . form tie, connecting bolt and wedge. Connecting bolt is inserted through adjoining forms and the loop of the tie. Wedge is inserted through the connecting bolt, locking and joining the panels. Its use with your present forms will make possibly considerable savings in labor.



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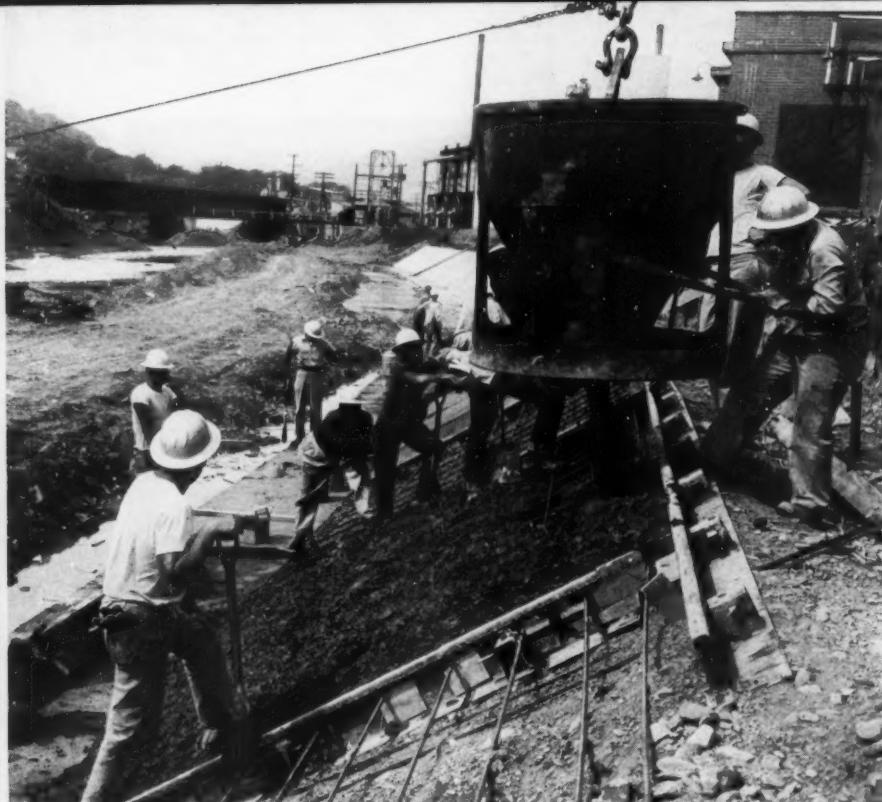


Photo courtesy Stow Manufacturing Co.

A bucket and crane was used to place the dry mix to the height of the forms on the Bradford flood wall project.

How to Place Concrete on a Slope

WHILE IT IS NOT AT ALL uncommon to encounter jobs that require both vibrating and screeding concrete on a slope, it is quite unusual to find these two operations being performed simultaneously with the same piece of equipment. This feat has been accomplished with good success and economy on an 8-inch thick concrete flood wall slab recently constructed at Bradford, Pennsylvania.

It was necessary to lay the slab on a bank that had a 1½:1 slope, and a further requirement of the specifications was the use of a 1½-inch slump concrete with gravel ranging in size from 1½ inch to 2 inches.

The successful bidder on this project was the Elmhurst Contracting Company of New York City, and the problem of vibrating the concrete on the steep slope was successfully solved through the use of a vibrating screed measuring 15 feet in length. Two gasoline-powered vibrating packs were used on the screed, and special mounting brackets were provided so that the

engines could be placed in a vertical position while the beam remained perpendicular to the side slope.

Probably the most serious problem encountered concerned the maneuvering of the vibrating screed. Although it would have been preferable to do the screeding from the top of the slope to the bottom in order to take advantage of gravity, it was found that this procedure caused the concrete to flow too rapidly ahead of the beam. Although this difficulty was promptly solved by screeding from the bottom to the top, it proved to be back-breaking work to move the screed against its own weight and the drag of the concrete. This was solved by using the power winch on a tow truck and simply hooking the cable to the screed and pulling it up the slope.

As the accompanying pictures show, the concrete was placed by bucket to the approximate height of the forms. When an entire 15-foot wide by 18-foot high section had been covered with the stiff mix, the screed engines

were started up at the bottom of the slab. The screed was then slowly pulled up the face of the concrete by means of the winch cable which was attached to an eyebolt in the center of the screed beam. The tow truck was normally operated on the top of the bank, but when there was insufficient room for this a sheave was provided at the top to permit the truck to operate below the bank. Moving on rollers which engaged the side forms, the vibrating screed moved slowly up the embankment, both striking off and consolidating the concrete as it passed.

It was found that under favorable conditions only one pass was required to obtain a satisfactory finish. Although on rare occasions the appearance of concrete bulges behind the screed made it necessary to make a second pass, even with these delays it was found that the average time for striking off and vibrating each section of the concrete was only a little over a minute. Upon the completion of each pass, the vibrating screed was attached by the



Here the vibrating screed is starting its pass from the bottom of the slope to the top. Note the cable attached at the center to ease the work of moving the heavy beam up the steep slope. The vibrating power units are driven by 2½ hp. gasoline engines.

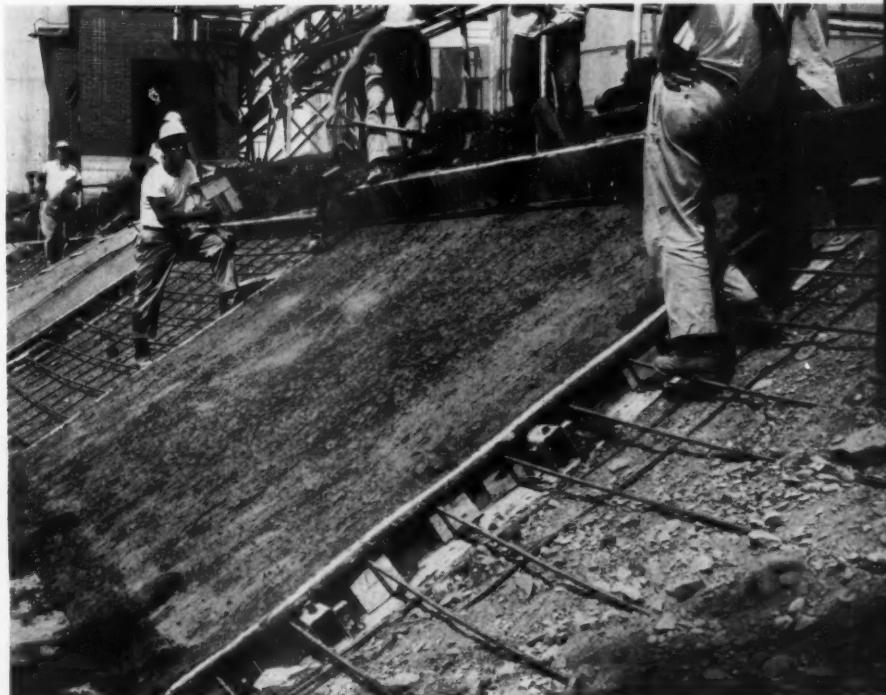
Here the screed has finished its pass and is ready to be moved to the bottom of an adjoining section. Final finishing is done by means of hand trowels.

eyebolt to the cable on a crane and lifted to the bottom of the adjoining section of floodwall. The final finish of the slab was obtained by means of hand trowelling.

It is the contractor's belief that the savings obtained by simultaneous vibrating and screeding might possibly run as high as 20 percent. It was found possible to place and finish approximately 44 cubic yards of concrete each day in this fashion—enough to complete eight of the 15 by 18-foot sections. The 3-mile floodwall was constructed for the Corps of Engineers under a 2.2 million dollar contract.

The normal procedure on a job of this type would have been to vibrate the concrete first with internal vibrators, and afterward to do the screeding as a separate operation. It is believed that the successful use of a vibrating screed on the Bradford flood wall was mainly the result of two favorable circumstances: The comparatively thin slab and the fact that the reinforcing steel was widely spaced.

END



Chicago is scene of first annual convention of National Concrete Contractors Association

Readers of Concrete Construction who plan to attend the first annual NCCA convention will find the complete program of this important meeting in the adjoining column. Opening in Chicago on Monday, February 24, with registration of members at the Morrison Hotel and the Coliseum, this convention will bring concrete contractors from all over the country together for the first time in history.

The Chicago convention carries out a decision reached by an organizing committee which met in the same city last summer to draft a preliminary constitution and set of by-laws. Among the objectives outlined for the new association at that time was the establishment of uniform standards within the industry, the promotion of better business relationships between concrete contractors and their suppliers, and the dissemination of accurate information concerning products and methods.

Under the direction of Jim St. Clair, chairman protom of the convention and executive secretary of the Concrete Contractors Association of Greater Chicago, the first session of the meeting will square off to the important job of forming working committees and selecting a slate of officers and directors to be elected on February 26, the final day of the convention. Committees and their chairmen will be selected from the association membership by the already-established executive policy committee.

A major highlight of the convention program will be an address by Roger H. Corbetta, president of the well-known construction firm which bears his name, and also a director of the Concrete Industry Board of New York City. Mr. Corbetta was one of the founders of the Concrete Industry Board, an organization which has been outstandingly successful in serving as a watchdog in matters affecting the quality and performance of concrete construction work. He is a vigorous and able speaker, as well as one of the most widely experienced and best informed concrete construction men in the country.

An important feature of the Chicago convention will be an exposition of products and processes related to concrete construction work. This trade show of the industry will be housed in Chicago's venerable Coliseum, where the convention sessions will also be held.

Also being offered to members in connection with their attendance at the convention is a tour of the Marquette Cement Manufacturing Company's new plant in nearby Milwaukee on Thursday, February 27. Members of NCCA are invited to attend the technical sessions of the American Concrete Institute which will be held in Chicago's Morrison Hotel on the same dates as the concrete contractors' meeting. ACI members are also invited to attend the NCCA sessions.

On the social side, the convention program includes a banquet to be held at the Morrison Hotel at 8:00 P. M. on

February 26. The ladies' program will include a fashion show to be held at the Terrace Casino of the Morrison Hotel and a conducted tour of Marshall Field's department store.

CONVENTION PROGRAM

February 24, 25 and 26, 1958
CHICAGO COLISEUM

ALL CONVENTION SESSIONS TO BE HELD IN
THE CHICAGO COLISEUM

Pre-Convention executive session
Sunday, February 23

Registration: Monday, February 24

Morrison Hotel—Beginning at 8:00 AM
Chicago Coliseum—Beginning at 8:45 AM

Monday—February 24

Convention sessions 9:00 AM to 12:00 Noon
Opening Session
Invocation
Preview Program for Convention—Jim St. Clair
Name working committees, chairmen and
meeting sites

Break

Speaker—Roger H. Corbetta, President
Corbetta Construction Co., Inc.—New
York, N. Y.
Adjourn 12:00 Noon
Trade Show opens at Noon today and runs to
6:00 PM

Tuesday—February 25

Convention session opens 9:00 AM
Committee Reports
Adjourn 12:00 Noon
Trade Show—12:00 Noon to 9:00 PM

Wednesday—February 26

Trade Show—9:00 AM to 5:00 PM
Convention Session opens 1:00 PM
Conclusion of unfinished business
Election of Officers and Directors
Adjourn at termination of business
Convention Banquet—8:00 PM
Morrison Hotel

Thursday—February 27

Tour of Marquette Cement Plant in Milwaukee

Friday—February 28

Departure for Hawaii from Midway Airport
—12:00 Midnight

LADIES' PROGRAM—The Chicago Hostess Committee has planned an enjoyable program of sightseeing and entertainment.

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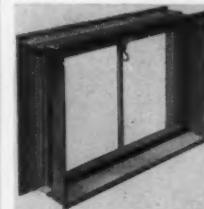
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Shoring Methods . . .

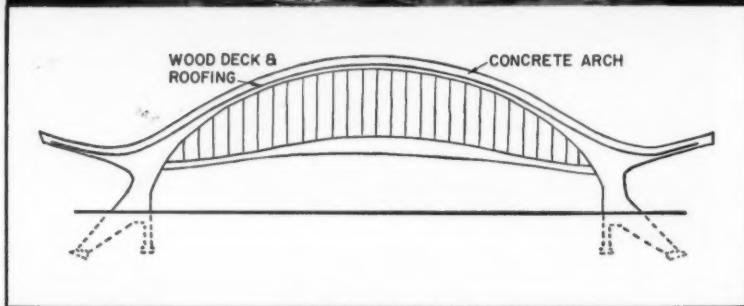
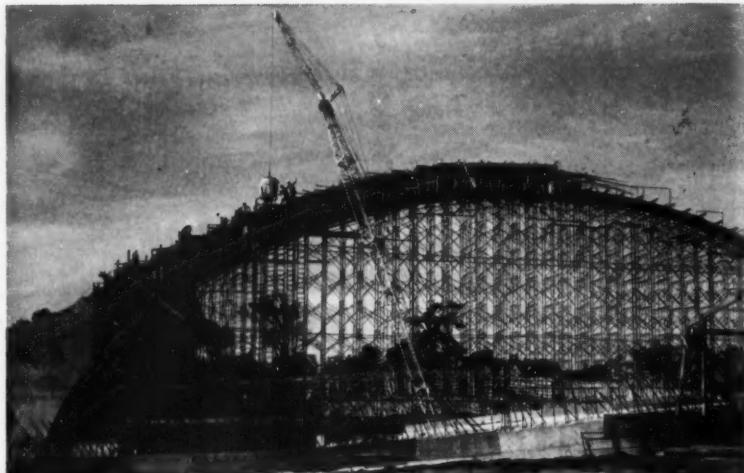
by Patent Scaffolding Co.

SAME COMPONENTS PROVIDE SHORING AND PLATFORMS; SPEED HUGE PARABOLIC ARCH

FOR BUILDING this huge, spine-like, 240'-long parabolic arch for the new, modern-design Yale University Hockey Rink, contractor, George B.H. Macomber Co., makes effective use of "Trouble Saver"® Scaffolding components for shoring and for working platforms.

2'-wide "Trouble Saver" Shoring units with built-in ladders support the area starting 21' in from each end of the arch. For a distance of 32' these units are placed 5' apart, perpendicular to the arch length, with 6" spacing between towers. The next 59' is shored with 5'-wide "Trouble Saver" frames, spaced 37" apart, parallel with the arch length, with 8" spacing between towers. 475 5'-wide frames and 410 2'-wide frames are in use. Horizontal bracing is achieved by "TubeLox"® Scaffolding members and 56 steel cable guys.

A separate working platform, made of 285 5'-wide "Trouble Saver" frames, is used on one side of the arch only for easy placing and removal of forms. "TubeLox" Scaffolding members tie this working platform to the shoring for extra safety.



HIGH, HEAVY BEAM SUPPORT—Southern Bidrs., Inc., needs only 228 "Trouble Saver" Shoring ladder frames, braced with "TubeLox" Scaffolding members, to support this 50'-high, 8"-thick arched concrete beam for St. Marks Church, Shreveport, La. Built-in ladders provide quick access for workers.



QUICK, STRONG BRIDGE SHORING—Due to its high load-bearing capacity, "Trouble Saver" Steel Shoring permits Snitly Brothers, contractor, to get an entirely accurate camber section for this 2-arch (each 52' long) underpass bridge on the new Peninsula Drive near Moses Lake, Wash. 396 shoring frames of various heights are erected quickly to support the slab thickness of 24" at pier edges and 12" at the 18'-high midspan points. By using versatile, prefabricated steel shoring, instead of wood, forming costs for highway bridges, overpasses and piers can be cut at least 25%. Highway Bulletin G208 gives complete facts, ask for it.

To help you with your scaffolding and concrete shoring methods, PS offers a complete nation-wide engineering service available to you locally. See the Yellow Pages in your 'phone directory for the nearest Patent Scaffolding office or representative that sells and rents "Gold Medal" Scaffolds.

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questions

QUESTION: Has any study been made to determine the best time of the year to apply paint to concrete slabs to mark traffic and parking lanes?

ANSWER: A study by the New Jersey Zinc Company was reported in the October, 1943, issue of *Paint Progress* magazine. The conclusion reached in this article is that the best time to apply traffic paint is at the beginning of a dry season, since durability seems to be harmed by excessive moisture during early months of exposure.

QUESTION: Have any articles been published on the pros and cons of leasing or owning automobiles and trucks?

ANSWER: Two articles on this subject have been published in the *Harvard Business Review*. One appeared in the March-April 1955 issue on page 75 entitled "Pros and Cons of Leasing Equipment" by Frank K. Greisinger. The other appeared in the July-August 1954 issue on page 108 under the title "Trend to Fleet Leasing" by John W. Rollins.

QUESTION: Is the hammer test reliable for determining whether or not concrete has been frozen?

ANSWER: Unfortunately frozen concrete may give the same ring when struck with a hammer as properly hardened concrete. A more reliable test is to apply hot water to the surface. If the concrete is frozen the surface material will soften.

QUESTION: How soon should concrete be placed in the forms after it is mixed?

ANSWER: There is actually a great deal more latitude than is generally supposed, but the common practice is to try to have the concrete in place within 45 minutes after mixing.

QUESTION: Does the presence of entrained air in concrete have an adverse effect on its abrasion resistance?

ANSWER: The effect should be negligible if the air content is kept below 6 percent, and proper curing conditions are provided.

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TO SOLVE the problem of consolidating low slump concrete in narrow, constricted areas, Viber offers these powerful, small diameter vibrators.

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Tip of vibrator housing is replaceable. Viber's patented rubber tip furnished unless steel specified.

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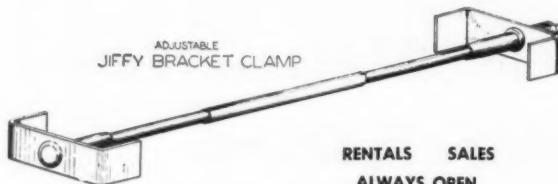
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Additional free information concerning any item described in these columns may be obtained by filling

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This amazing new tool works like MAGIC ANYWHERE you have a pier, wall or beam of any dimension to form up for concrete pour. Simple and practical.

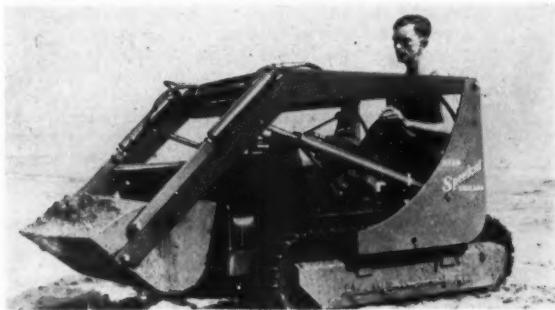
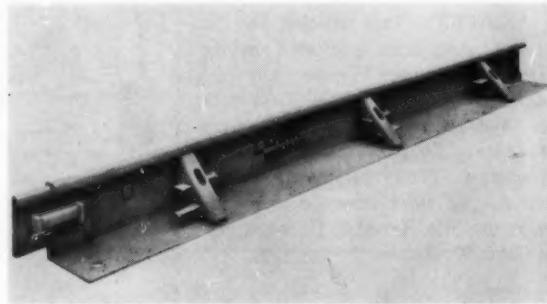
The JIFFY is positively the latest form accessory on the market and is guaranteed to at least HALF your cost.

Bracket Clamp

Cost savings of as much as 50 per cent are claimed in the forming of columns, corner piers and deep concrete beams with a new accessory bracket clamp pictured here. According to the manufacturer considerable economy can be achieved because a relatively small number of the clamps suffices for almost any job without sacrificing either quality or safety. These adjustable clamps can be purchased or rented. **Jiffy Clamp Company, 2130 Wiley Street, Hollywood, California.**

Steel Paving Form

Wedge-Lok makes a rigid joint between forms for road building. Sections are joined to form a continuous beam, eliminating joint deflection. The forms are made from heavy duty $\frac{1}{4}$ -inch steel plate. Stake pockets, guides and Wedge-Lok are welded; there are no rivets to loosen. Base of forms is beveled at end for inside curves. Stakes are 1-inch diameter heavy duty high carbon steel. **Clark Industries, Paving Form Division, 375 East Fifth Avenue, Columbus, Ohio.**



Bantam Tractor

This midget tractor now offers a hydraulic dump as optional equipment. The bucket can be held rigidly at any desired angle with the ground, and rotated while in motion to dig and scoop up the largest possible load. By rolling the bucket lip up, larger loads can be carried, heaped above the rim of the bucket and even wet or liquid material can be retained. **Mead Specialties Company, Dept. SC-39, 4114 North Knox Avenue, Chicago 41, Illinois.**

External Vibrator

Pictured here in use on concrete formwork is a low-maintenance pneumatic vibrator designed for external use only. It has only one moving part—an air jet driven rotary eccentric turbine of bronze alloy. Up to 8 thousand 2600-pound blows are struck per minute on the largest forms. Steam and hydraulic driven models are also available for special application. **McCaron Brothers, P. O. Box 336, Baldwin Park, California.**



equipment and tools

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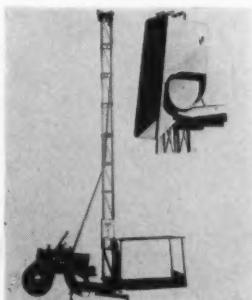
Form Sprayer

A lightweight, high-volume spray rig pumps liquid water repellents, form oils and similar fluids direct from original 55-gallon drums to spray nozzle. Fingertip trigger on spray gun automatically starts and stops the lightweight air-powered pump. Adjustable nozzle on gun can be quickly varied for heavy or fine spray to suit the operation. **Gray Company, Inc., 1002 Sibley Street N.E., Minneapolis 13, Minnesota.**



Concrete Bucket

Fully automatic, this 13-cubic foot concrete bucket is designed as companion accessory for Tusky Hoist. Bucket, which is interchangeable with platform, may be operated from the ground or from any working height up to 100 feet. Movement up and down is automatically controlled. **Tusky Division, Tubular Structures Corporation, 2960 Marsh Street, Los Angeles 39, California.**



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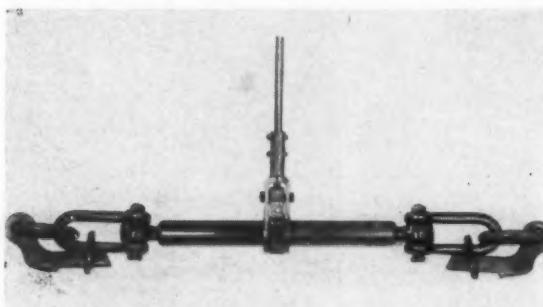
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equipment tools materials

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out and mailing the postage-free reader service cards which may be found in the center spread of this issue.



Truck Crane

This new, air controlled truck crane is a heavy duty machine with a rated capacity of 40 tons which can be easily and quickly stripped for travel. To accomplish this the truck crane is equipped with a new outrigger system which permits substantial weight reductions in the carrier while providing a solid, steady foundation for the powerful, massive crane upper works and deep section boom needed for a crane of this capacity. The carrier is available in 9- and 10-foot widths and the comfortable cab provides good visibility. **American Hoist & Derrick Company, 63 South Robert, St. Paul, Minnesota.**

Construction Jack

A new type jack features removable end linkages achieved by bolt joint, providing greater flexibility of use. Various type linkage methods can be interchanged to provide a wide range of applications or it can be used without linkage, permitting special hook-ups through screw eyes for special jobs. Designed for work on coffer dams, concrete and steel construction requiring false work or framing, bridge construction and maintenance, marine towing and wharf activities, the jack can be furnished with any combination of hooks including shackles. **Templeton, Kenly and Company, Broadview, Illinois.**



Joint Groover

This joint groover widens or cleans sawed or hand formed joints in cement or bituminous concrete, new or old, widens sawed joints in new concrete before sealing, removes old seal material for resealing maintenance jobs, mills and widens, without spalling, random or uncontrolled cracks in cement or bituminous concrete, to width and depth for proper sealing. Bit will enter a crack 1/32-inch wide, or will make a groove where no crack exists. **Windsor Machinery Corporation, 85 Grassmere Avenue, Elmwood 10, Connecticut.**

Concrete Cleaner

A new acid in powder form is mixed with water, applied in the same manner as muriatic acid and when surface is clean, flushed away with water. Unlike muriatic acid it does not fume, is less corrosive to metals and will not discolor white cements. The product is recommended for use prior to applying paint to concrete surfaces to assure beautiful, long-lasting paint jobs. It is safe and effective whether used by professional workers or amateurs. **The Garman Company, Inc., St. Louis 23, Missouri.**

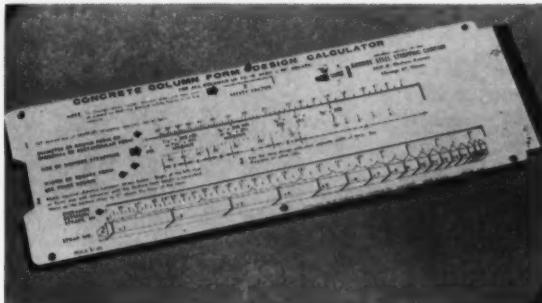


equipment and tools

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Column Form Design Calculator

Construction costs are reduced by using standardized column form designs that are easy to erect and fast to strip. A pocket calculator answers troublesome problems of form design on columns and piers up to 48 inches square or 65 inches diameter, including rectangular cross sections. It specifies the correct lumber sizes, the arrangement and spacing of the bracing members, and the proper size and spacing of the steel strapping which replaces clamps in these designs. **Signode Steel Strapping Company, Calculator Department, 2600 North Western Avenue, Chicago 47, Illinois.**



Power Buggy

Carrying 3000 pounds in an 18-cubic foot hopper, the Moto-Bug climbs a 25 percent grade and turns in an 82-inch radius. As a forklift it raises 1500 pounds to 7 feet turning in an 84-inch radius. Direct drive to the power flow transmission allows a 12-mph. forward or reverse speed. The engine is sidemounted for operator comfort. Rear-wheel steering and internal expanding brakes are automotive type. Electric starting and L. P. gas equipment are optional. **Kwik-Mix Company, Division of Koehring Company, Port Washington, Wisconsin.**



FEBRUARY 1958

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2

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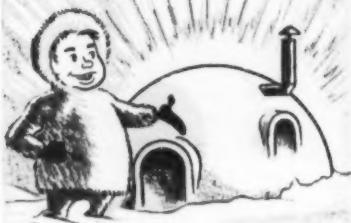
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26-3



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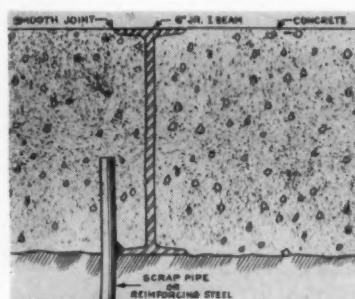


Hoist Platform Cage

This cage, for use where loads must be hoisted on a closed platform, is built to fit the standard Buck platform. It does not have to be removed when the Hoistower is raised or lowered. The Buck Portable Hoistower can be transported with the cage installed. An automatic gate is available. **Buck Equipment Corporation, 720-X Anderson Ferry Road, Cincinnati, Ohio.**

Shaker Sieve

The sieve platform in this low cost dynamic sieve shaker is rotated in a circular arc and swayed in a vertical arc simultaneously. It is used for field, laboratory and production sieving or grading operations on soils, sand, gravel, aggregates, chemical powders, plastics, powdered metal, small parts, bearings and similar granular or powdery substances. **Soiltest, Inc., 4711 West North Avenue, Chicago 39, Illinois.**



Steel Beam Joint

A construction technique uses a 6-inch lightweight structural steel member as an expansion joint between concrete paving sections. The beam is used as a screed to strike off the concrete without having to wait for one section to set before pouring the next. The method is said to give a smoother floor. **Jones & Laughlin Steel Corporation, 3 Gateway Center, Pittsburgh 30, Pennsylvania.**

Utility Pump

This new utility pump incorporates a defuser priming system that permits rapid priming with a minimum of water in the pump case. A cover plate may be removed for inspection. It has tapped holes for vacuum and pressure gauges and a drain plug. Discharge outlet can be changed to any of three positions. **Marlow Pumps, Division of Bell & Gossett, Midland Park, New Jersey.**



Literature

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Plastic form liners. Lustreform No. 2900 is a specially compounded plastic available in flat sheets or shaped to contours as desired. Super-smooth, high lustre concrete panels are produced through its use, and it is especially effective in color work. It is available from reliable distributor-fabricators, shaped to specified design. Described in a brochure No. 57-3. United States Rubber Company, 2638 North Pulaski Road, Chicago 39, Illinois.

Bulletin on testing. The first issue of "The Testing World" has just been published. This is a monthly paper available without charge to any reader interested in receiving it. It is devoted to descriptions of testing apparatus and techniques, as well as to general information about the concrete industry. Soiltest, Inc., 4711 West North Avenue, Chicago 39, Illinois.

Conveyor. Leaflet 357M tells the story of the Faircrete concrete conveyor in placing concrete. Two men can move concrete from transit-mix truck to form, delivering at any desired rate and discharging at heights up to 26 feet. The belt rides on 4-inch triple-troughing idlers fitted with ball bearings that lessen friction wear and material spillage. The machine is designed with self-cleaning features, travels easily behind a truck. While it is tailor-made for concrete, it can be used for handling other materials. The Fairfield Engineering Company, Marion, Ohio.

Chemicals for concrete. A catalog presents descriptions of Sika Chemical Corporation admixtures, joint sealers, coatings and maintenance materials. The book is arranged with file index cards for easy reference to the proper product for any use, and complete descriptions, specifications and installation instructions are given for each. A profusion of graphs, photographs and diagrams accompany the material presented in the catalog, making it a valuable handbook for concrete construction work. Sika Chemical Corporation, Passaic, New Jersey.

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& rugged..
fast & safe

One quick look at the Challenge Instant Trowel, side by side with ANY competitive machine, is all you need to prove it is the strongest, most rugged machine on the market. Compare the rugged dual handle; $\frac{3}{4}$ " stationary guard ring; the extra strong spider plate with 1" hex bars — the $1\frac{1}{4}$ " main shaft is the largest in the industry

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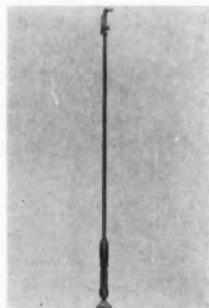
Trailer Hoist

Erection costs are eliminated and trucking problems reduced by the use of this tilt-up tower and hoist combination. Erection time for the standard 35-foot tower is two minutes. Additional sections may be added. The entire unit trails readily behind any pick-up truck on its own pneumatic-tired wheels. **Thomas Hoist Company, 20 S. Hoyne Avenue, Chicago 12, Illinois.**



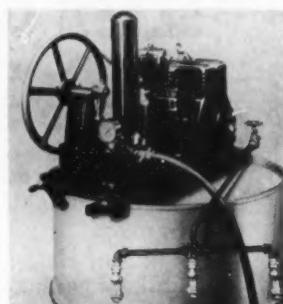
Backfill Tamper

With an overall length of 107½ inches, this tamper is particularly suitable for preparing holes when setting utility poles. The crescent shaped butt is designed to fit utility work and provides easy "walking." The throttle valve has a lock-on clip to permit use of the tool while backfilling the pole at the surface. **Portable Compressor and Contractors' Tools Division, Worthington Corporation, Holyoke, Massachusetts.**



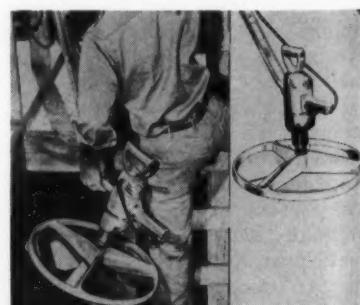
Pump for Repellents

A unique pump is available for applying silicone water repellents to any masonry structure. It can be used by contractors and building maintenance men for applying silicone type water repellents above ground to brick, concrete, concrete block, cinder block and sandstone, as well as pitch base coatings below grade before backfills are made. **The Campbell-Hausfield Company, Harrison, Ohio.**



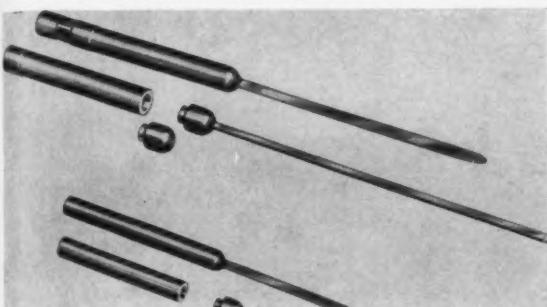
Power Trowel

A low-cost, 18-pound, 20-inch trowel takes advantage of friction and speed in place of weight for concrete finishing. Blades telescope for finishing flush with curbs. The unit collapses for carrying in car trunk. It finishes 2000 square feet per hour, working stiff, dry mixes not workable by hand. **Goldblatt Tool Company, 1910 Walnut Street, Kansas City 8, Missouri.**



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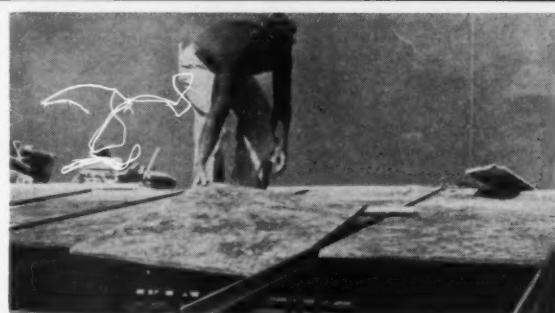
out and mailing the postage-free reader service cards which may be found in the center spread of this issue.

Vibrator Blades

These 17-pound Sabre blades come in varying lengths and attach readily to Dart vibrators. Operating up to 10,000 rpm at high cycle or 14,000 rpm at 60 cycle, the slender blades offer full force, amplitude and frequency for close work in prestressed concrete or in any restricted area where normal vibrators cannot do the job. Sabre blade action eliminates bubbles along sides, gives better concrete bond. Blades are easily removed for normal submersion use of the vibrator. **Dart Manufacturing and Sales Company, 1002 South Jason Street, Denver, Colorado.**

Form Board

The incombustible, fibrous glass form board being installed by this workman serves as a permanent form for poured-in-place light weight roof decks, as an attractive interior ceiling, as an acoustical ceiling and as roof insulation. It is available in various sizes and in thicknesses to meet specific thermal requirements. Three types are manufactured: a deluxe product with a white Fiberglas mat facing, a type for industrial users and an economy type for concealed areas. **Owens-Corning Fiberglas Corporation, Toledo 1, Ohio.**



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literature

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Compactor. The Kelley Compactor Power Float is said to produce superior wear-resistant floors, driveways, ramps, runways and walks with real savings in time and materials. This portable machine and its use on both monolithic and double course floors is described in detail in Bulletin K-101. Kelley Machine Division, Wiesner-Rapp Company, Inc., 285 Hinman Avenue, Buffalo 23, New York.

Compressor. Hydrovane Rotary Compressors are presented in Bulletin No. E-268. Among features stressed is accessibility for inspection or repair, and reduction in number of working parts. Illustrations include cut-a-way photos taken from directly below the unit and sectional views of each side. Component parts are also shown. Davey Compressor Company, Kent, Ohio.

Foaming agent. A booklet contains charts and graphs derived from research conducted at the University of Michigan Engineering Research Institute on Elastizell, a liquid chemical which is used as a basis for making strong, lightweight, insulating, moisture-resistant concretes of many uses from sand, cement, water and air. With Elastizell complete control is possible over such physical properties as density, weight, strength and insulating value—and also over cost. Stocking various aggregates is unnecessary for Elastizell-type concrete incorporates all the advantages found in today's diverse aggregate market and eliminates the complexities involved in choosing a specific lightweight aggregate for a specific application. Booklet 2gEL is available from Elastizell Corporation of America, 815 West Miller Street, Alpena, Michigan.

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